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GA 1.13:PLRD-82-25

BY THE U.S. GENERAL ACCOUNTING OFFICE

Report To The Secretary Of Defense

Mission Item Essentiality: An Important Management Tool For Making More Informed Logistics Decisions

COMPLETED

ORIGINAL

Mission item essentiality, the means by which the essentiality of individual items is linked to mission essentiality of the end-item, offers vast potential as a management tool for the services in making logistics decisions concerning requirements determination, resource allocation, and repair priorities.

The Department of Defense has developed a concept guide for use by the services. However, the Department has allowed the services to proceed at their own pace and approach the matter from different viewpoints. As a result, progress has been slow.

GAO believes that the Department should require the services to follow the concept guide and establish milestones for accomplishing the specific tasks set forth in the guide.

The Air Force is ahead of the other services in developing a conceptually sound essentiality coding system but has run into problems in implementing the system. GAO believes that once the implementation problems have been resolved, the system will greatly benefit the Air Force in its logistics decision-making process.

PLRD-82-25
JANUARY 13, 1982

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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

PROCUREMENT, LOGISTICS,
AND READINESS DIVISION

B-205399

The Honorable Caspar W. Weinberger
The Secretary of Defense

Attention: Director, GAO Affairs

Dear Mr. Secretary:

This report discusses the services' uses of essentiality coding in making logistics decisions concerning requirements determination, resource allocation, and repair priorities.

We made our review as part of our continuing effort to ascertain if the services' requirements determination systems provide for procedures to realistically determine and identify priority needs.

This report contains recommendations to you on pages 13 and 20. As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and the Senate Committee on Governmental Affairs not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Director, Office of Management and Budget; the Chairmen, House Committee on Government Operations, Senate Committee on Governmental Affairs, and House and Senate Committees on Appropriations and on Armed Services; and the Secretaries of the Army, Navy, and Air Force.

Sincerely yours,

Donald J. Horan

Donald J. Horan
Director

B

GENERAL ACCOUNTING OFFICE
REPORT TO THE SECRETARY OF
DEFENSE

MISSION ITEM ESSENTIALITY: AN IMPORTANT MANAGEMENT TOOL FOR MAKING MORE INFORMED LOGISTICS DECISIONS

D I G E S T

The services could make more informed logistics decisions in determining peacetime and wartime requirements, allocating resources, and setting repair priorities by ensuring that the more essential items receive increased management attention and funding priorities.

WHY THE REVIEW WAS MADE

GAO previously reported on the need for considering essentiality in determining war reserve requirements and safety levels. In response to GAO's report on war reserves, the Air Force advised that it had developed a coding system which linked item essentiality to mission essentiality. GAO made this review to determine the extent to which the system had been implemented, what benefits had resulted, and whether the system could be used by the other services.

WHAT THE REVIEW SHOWED

The logistics community has long recognized the importance of identifying and measuring the relative merit of maintaining stocks of a given item over stocking some other item. Making this differentiation is ordinarily referred to as determining the essentiality of an item. It involves establishing the relationship of an item to the subsystem and the importance of the subsystem to the system in comparison to other systems.

The Air Force has taken the lead in developing an essentiality system, and the Department of Defense (DOD) issued a concept paper (see app. I) which generally adopted the Air Force's approach as a suggested model for the other services to follow. Although DOD is the prime mover behind the services developing an essentiality-based logistics system, it has allowed the services to proceed at their own pace and to use their own approach for developing such a system. The lack of a coordinated approach has resulted in each service approaching the

objective from different directions and, based on the slow progress to date, it is questionable if the services will achieve the objective within the near future.

THE AIR FORCE'S SYSTEM

The Air Force developed a three-digit coding system which relates the essentiality of a part to the subsystem, the subsystem to the weapons system, and the weapons system to other Air Force systems. However, its use as a management tool for making key logistics decisions concerning requirements determination, resource allocation, and repair priority has been limited because:

--The vast majority (about 87 percent) of Air Force-managed reparable items are coded mission essential, thus limiting management's use of item essentiality as a management tool.

--A higher essentiality priority is assigned to certain items that have no effect on mission capability, and a lower priority is assigned to certain items that prevent or impair mission accomplishment.

--Managers responsible for determining repair priorities and scheduling work for the repair facilities do not trust the validity of the essentiality codes and consider other factors more important in making these determinations.

THE ARMY'S SYSTEM

The Army has not developed a coding system which links the essentiality of an individual item to the end item. Instead, its essentiality coding is limited to the relationship of the individual item to the subsystem. Thus, while an item may be essential to the operation of the subsystem, the subsystem may not be essential to the operation of the end item/system.

The Army recognizes the importance of an essentiality-based logistics system, but believes there are two primary issues which need to be resolved. First, how to establish a relative ranking of the weapons systems in relation to mission accomplishment, and second, how to assign essentiality to an item which has multiple applications.

These issues will be addressed by the Army Inventory Research Office as part of a study effort to determine the use of essentiality coding in the requirements determination process.

THE NAVY'S SYSTEM

The Navy also has long recognized the importance and usefulness of mission essentiality as a management tool. However, until recently, there was no real effort to implement an essentiality system because, as characterized by a 1960 Navy study, essentiality is highly subjective and the tendency is to code all items as highly essential.

However, in an effort to increase fleet readiness by reducing repair and overhaul turnaround time, the Navy developed an essentiality coding system for specific ship classes. The system relates the need for stocking an item to its mission accomplishment. According to Navy studies, the essentiality configured allowance lists will significantly increase the operational availability of ships. The major difference between this essentiality system and the system proposed by the Air Force is that the Navy's system is for specific classes of ships at the retail (user) level, whereas the Air Force's system is directed at the wholesale (depot) level.

The Navy plans to extend the essentiality system to the wholesale inventory level. Additionally, the Navy recently initiated efforts to determine item and mission essentiality for its aircraft.

RECOMMENDATIONS

GAO recommends that the Secretary of Defense orchestrate the efforts of the services in developing and implementing an essentiality-based logistics system.

GAO also recommends that the Secretary of Defense establish milestones for accomplishing each of the tasks identified in the concept paper and monitor the services' progress for achieving these milestones.

GAO further recommends that the Secretary of Defense direct the Secretary of the Air Force to:

Tear Sheet

--Develop essentiality coding criteria which make the coding system more responsive and permit the logistics system to better meet user needs. Also, review the current situation where the vast majority of items are coded mission essential.

--Regularly review the relationship between item essentiality and subsystem essentiality to identify and reconcile inconsistencies in these relationships.

Other recommendations to the Secretary of Defense are shown on page 13.

AGENCY COMMENTS

DOD generally agreed with the recommendations that it (1) assume responsibility for orchestrating the services' efforts in developing and implementing an essentiality-based logistics system, (2) establish milestones for the services to accomplish the needed essentiality tasks identified in its essentiality concept paper, and (3) direct the Air Force to develop essentiality coding criteria which make the coding system more responsive so that logistics support better meets user needs.

DOD did not agree with GAO's draft recommendation that the Air Force determine why subsystem essentiality, as opposed to item essentiality, is the driving factor for determining the essentiality ranking. DOD said that no one position of the coding scheme has priority over another code position.

The draft recommendation was directed at what appeared to be the reason for inconsistencies identified during the review--certain items which do not affect the mission capability of a weapons system have a higher priority ranking than other items which prevent or impair the mission capability of the weapons systems.

In summary, DOD stated that the Air Force recognizes that coding inconsistencies can occur and that the Air Force will continue to review and refine the coding as necessary. To eliminate the confusion perceived by the Air Force and DOD, GAO clarified the recommendation.

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ABBREVIATIONS

AFLC	Air Force Logistics Command
ASO	Aviation Supply Office
DOD	Department of Defense

FLSIP	Fleet Logistics Support Improvement Program
GAO	General Accounting Office
MCO-COSAL	Maintenance Criticality Oriented-Coordinated Shipboard Allowance List
SPCC	Ships Parts Control Center
TSARCOM	Troop Support and Aviation Materiel Readiness Command

CHAPTER 1

INTRODUCTION

Logistics managers in the services are responsible for managing billions of dollars of spares and repair parts to meet the needs of their users. As part of their management responsibilities, managers must decide what and how many items to buy or repair and when these actions should be taken.

In times of full funding, managers generally defer to the procurement and repair decisions generated by the services' automated requirements determination systems. However, in times of restricted funding, as is normally the case, these decisions are much more complex since trade-offs must be made as to what and how much should be bought or repaired. To make these decisions, prudent management should dictate that the emphasis be placed on those items essential to mission accomplishment. However, each service defines essentiality differently. In the case of the Army, essentiality means the indentured relationship between a part and its subsystem. On the other hand, the Air Force has expanded the meaning of essentiality to include the relationship between the subsystem and system and the relative importance of the system to other systems for accomplishing a mission. The term used by the Air Force to describe this relationship is mission item essentiality.

The services have addressed--with varying degrees of success--the issue of mission essentiality, but their efforts have been complicated by problems in determining which items are essential and how an essentiality system should be implemented.

OBJECTIVES, SCOPE, AND METHODOLOGY

We made this review because of our earlier efforts stressing the need to identify essential items, the Air Force's positive response to the essentiality issue, and the Department of Defense's (DOD's) apparent endorsement of the essentiality concept. We evaluated the Air Force's system and determined what benefits have been achieved. We also compared the Air Force's efforts to the other services' efforts to, once again, stress the usefulness of essentiality as a management tool for making logistics decisions. However, we could not fully achieve our objectives because the Air Force had not fully implemented its item essentiality coding system and thus could not point to specific benefits. As a result, we evaluated the system's implementation and identified problem areas.

We made our review at the Air Force Logistics Command (AFLC) in Dayton, Ohio; the Aviation Supply Office (ASO) in Philadelphia, Pennsylvania; the Ships Parts Control Center (SPCC) in Mechanicsburg, Pennsylvania; the Troop Support and Aviation Materiel Readiness Command (TSARCOM) in St. Louis, Missouri; and the

respective services' headquarters in Washington, D.C.

For each of the services, we obtained information about the role item essentiality plays in the inventory management process for (1) determining requirements, (2) allocating resources, and (3) determining repair work scheduling. In those cases where essentiality did not play a role, we determined if, and to what extent, plans existed for developing an essentiality-based supply system. We also reviewed studies performed by the services and DOD and discussed with appropriate officials the pros and cons of using essentiality as a management tool for making logistics decisions. We also met with officials of the Logistics Management Institute--a contractor--to obtain information about the various models it is developing for the Air Force on relating parts, procurement, and repair funding levels to enhance aircraft availability.

CHAPTER 2

MISSION ITEM ESSENTIALITY--A RECOGNIZED NEED THAT IS NOT BEING MET

The logistics community has long recognized the importance of identifying and measuring the relative merit of maintaining stocks of a given item over stocking some other item. Making this differentiation is referred to as determining the essentiality of an item. While this determination may seem relatively easy, in fact, it is a difficult and complex procedure because it involves more than just the individual item in question. It also involves identifying the relationship of the item to the subsystem and the importance of the subsystem to the system in comparison to other systems.

The services, in varying degrees, consider item essentiality as part of the decisionmaking process for one or more of the following logistics decisions.

--Assigning a factor in the variable safety level computation.

--Identifying war reserve candidates.

--Developing repair schedules for reparable items.

--Identifying items for intensive management.

--Identifying items for stockage when the items do not qualify for demand-based stockage.

Item essentiality should be placed in its proper perspective. In the case of the Army, item essentiality is used in the context of the importance of an item to the successful operation of the subsystem. Thus, while an item may be essential to the operation of the subsystem, the subsystem may not be critical to the operation of the system. In contrast, the Navy considers all stocked items to be equally essential. However, the recently approved Navy coding scheme (see p. 10) will enable the Navy to stratify shipboard allowances among five levels of essentiality.

Although item essentiality may be considered in making certain decisions, its present use is somewhat limited. For example:

--Although the safety level formula includes an item essentiality factor, the services have negated its use by assigning a constant value to the factor.

--As defined by the Army, item essentiality is only one of several criteria that must be met in order for an item to be considered as a war reserve candidate.

--The Air Force considers item essentiality in developing repair workload schedules. However, in the execution phase, other factors determine which items are repaired first. Paramount among these factors are cost of the item, coupled with immediate need, and availability of repair facilities which are specialized according to item type.

Thus, it is in these contexts that item essentiality is used in the logistics decisionmaking process. As evident by the above, the full potential of item essentiality as a management tool has not been realized, and in many cases, the services are doing little more than paying lip service to the concept. Even in the case of the Air Force, which is in the forefront of developing an essentiality-based logistics system, there are serious concerns about such a system's usefulness, and as a result, progress in implementing essentiality coding has been slow.

The following sections discuss the initiatives the services have taken toward developing an essentiality system and the actions still needed.

DOD'S EMPHASIS ON IDENTIFYING MISSION ESSENTIALITY OF ITEMS

DOD, as part of its report, "Stockage Policy Analysis," developed a concept paper (see app. I) which states the tasks for developing and implementing an essentiality system for the wholesale requirements determination of secondary items. The specific tasks involve (1) establishing a coding system which relates item essentiality to subsystem essentiality and subsystem essentiality to system essentiality, (2) integrating the coding technique into the performance measurement process, and (3) implementing the coding technique into the actual computation of requirements. In essence, DOD's paper adopted and endorsed the Air Force's mission item essentiality coding system. This system establishes the relationship of individual items to subsystems, subsystems to end items, and the mission essentiality of the end items. Although the concept paper stresses the importance of an uniform coding system, it does not instruct the services how to develop and implement the system.

As a result, the Air Force, Army, and Navy are addressing the issue of essentiality differently. The Air Force addresses essentiality from the depot (wholesale) level, the Navy from the user (retail) level, and the Army has generally adopted a wait-and-see attitude. While the Air Force and Navy approaches have merit, there is a question as to whether these different approaches will result in a uniform system.

THE AIR FORCE HAS DEVELOPED AN ESSENTIALITY CODING SYSTEM

The Air Force developed a three-digit coding system which relates the essentiality of a part to the subsystem, the subsystem to the weapons system, and the weapons system to other Air Force systems. The following tables show the definition of each element of the three-digit code.

The first digit is the system essentiality code which is expressed as a numeric value of 1 through 6 and represents the logistics support priorities the Air Staff has established. A definition of each value follows:

First digit	Definition	Example
1	Highly critical system	EC-135N
2	Strategic system	B-52
3	Forward deployed system	F-15
4	Continental United States system to be in place 1 day after the war starts	F-4C
5	Reserve system to be in place 30 days after the war starts	A-7D
6	Rear echelon and systems to be in place 90 days after the war starts	C-131E

The second digit is the subsystem essentiality code and is expressed as an alphabetic code of A through D. The code is based on the criticality of the subsystem to the weapons or support system, as determined by the majority of weapons system users. A definition of each code follows:

Second digit	Definition
A	Lack of subsystem prevents performing any wartime/peacetime missions.
B	Lack of subsystem prevents performing wartime mission.
C	Lack of subsystem impairs performance of wartime mission.
D	Lack of subsystem prevents performing peacetime mission.

The third digit is the item essentiality code and is expressed as an alphabetic code of E through G. The code is assigned by an equipment specialist at each of the air logistics centers, and it indicates how essential an item is to the operation of the subsystem. A definition of each code follows:

Third digit	Definition
E	Lack of item prevents subsystem or end item from performing its designed function.
F	Lack of item impairs/degrades subsystem or end item performance so that the designed function cannot be performed fully.
G	Lack of item does not affect the performance of the subsystem or end item.

As currently configured, the coding system allows for 72 different priorities, as shown below. The first 36 priorities are considered to be mission critical and mission essential codes. (See p. 14.)

Priorities	Codes
1 - 9	1AE, 1BE, 1CE, 2AE, 2BE, 2CE, 3AE, 3BE, 3CE
10 - 18	1AF, 1BF, 1CF, 2AF, 2BF, 2CF, 3AF, 3BF, 3CF
19 - 27	4AE, 4BE, 4CE, 5AE, 5BE, 5CE, 6AE, 6BE, 6CE
28 - 36	4AF, 4BF, 4CF, 5AF, 5BF, 5CF, 6AF, 6BF, 6CF
37 - 42	1AG, 2AG, 3AG, 4AG, 5AG, 6AG
43 - 48	1BG, 2BG, 3BG, 4BG, 5BG, 6BG
49 - 54	1CG, 2CG, 3CG, 4CG, 5CG, 6CG
55 - 60	1DE, 2DE, 3DE, 4DE, 5DE, 6DE
61 - 66	1DF, 2DF, 3DF, 4DF, 5DF, 6DF
67 - 72	1DG, 2DG, 3DG, 4DG, 5DG, 6DG

According to DOD and Air Force officials, coding has been completed for reparable and consumable items, with the coding of support equipment scheduled for completion in about 1 year. When fully implemented, the system will enable the Air Force to better (1) justify and allocate resources, (2) identify items for which a war reserve requirement is needed, and (3) schedule items for repair.

However, this system, as currently planned for implementation, may not accomplish its intended objectives because of the following problem areas:

--About 87 percent of the items are coded as mission essential.

--A higher essentiality priority is given to certain items which have no effect on mission capability, while a lower

essentiality priority is given to items which prevent or impair mission accomplishment.

--The system essentiality part of the code has limited current or planned usage.

--Essentiality coding does not play a major role in (1) justifying or allocating resources, (2) identifying war reserve candidates, or (3) scheduling parts for repair.

Chapter 3 discusses these problems in detail.

THE ARMY'S USE OF ESSENTIALITY CODING IS LIMITED

The Army, unlike the Air Force, has not developed an essentiality coding system which covers the spectrum from individual item to weapons system. Instead, its essentiality coding is limited to the relationship of the item to the assembly. Thus, while an item may be essential to the operation of the assembly, the assembly may not be essential to the operation of the end item system. Furthermore, the Army has not attempted to determine the relative importance of its weapons systems.

The Army assigns an essentiality code, in the context described above, during the initial provisioning process. However, its use has been limited to that of one of several criteria for identifying war reserve candidates.

Army officials said that they recognize the importance of an essentiality-based logistics system, but there are two basic issues that need to be resolved before any detailed planning occurs. First, how to establish a relative ranking of the weapons systems in relation to mission accomplishment, and second, how to assign essentiality to an item which is used on more than one end item.

The Army Inventory Research Office will address these issues as part of a study effort to determine the potential use of essentiality coding in the requirements determination process at the wholesale level. At the time of our review, however, the Office was just planning its study and could not estimate when the study would be completed or what the Army's resolution to the issues would be. Army officials also told us that, with the implementation of DOD's retail inventory management and stockage policy program, essentiality coding will be used to select items for stockage and to establish safety levels at the retail level.

Weapons system rankings and essentiality of items with multiple application are important issues that need to be answered. Only the individual service can determine the mission essentiality of weapons systems. Once this has been determined and the weapons systems ranked, the essentiality of items with multiple weapons

systems applications becomes less important, because the complete code would be the main factor in determining the repair priority, requirements, and resource allocation.

THE NAVY S EFFORTS TO ESTABLISH AN ESSENTIALITY SYSTEM

The Navy has long recognized the importance and the usefulness of mission essentiality as a management tool for (1) selecting items for stockage, (2) allocating repair program resources, (3) setting safety levels, and (4) computing wholesale level stockage requirements. The role of item essentiality currently is limited to initial provisioning, identifying war reserve candidates, and assigning repair priorities. It does not enter into the decisionmaking process for determining safety levels or for computing wholesale level stockage requirements.

The major reasons cited by the Navy for the limited use of item essentiality are the high degree of subjectivity in determining the essentiality of an item and the Navy has not ranked the importance of its weapons systems in terms of mission accomplishment. According to our 1981 report, 1/ Navy officials said the Navy did not have the technical capability to determine the mission essentiality of weapons systems, and it was not feasible to determine the relative essentiality for most items because the items could be used for more than one system.

DOD and Navy officials later said that DOD approved the Navy's essentiality coding scheme in October 1981 and that it would be used in the variable cost models for determining stockage levels of wholesale and retail inventories. Initially, the codes will be used to determine shipboard allowances in support of mission weapons systems. However, the Navy is also pursuing essentiality coding of aircraft weapons systems for use at the wholesale and retail inventory levels.

Prior efforts to establish essentiality

In 1960 the Navy's Advance Logistics Research and Development Branch performed a study which outlined the usefulness of mission essentiality coding for identifying initial provisioning items. The study cautioned that, because of the highly subjective nature of essentiality, there is a tendency to code all items as highly essential, thereby negating any benefits an essentiality coding system may have.

In 1965 the Navy implemented a military essentiality coding system for aviation and ships parts. Parts are coded as either

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1/"Logistics Managers Need to Consider Operational Readiness in Setting Safety Level Stocks" (PLRD-81-52, Aug. 10, 1981).

"1" for vital items or "3" for nonvital items. However, even today--16 years later--the coding system is used only to identify initial allowance items.

The Navy's coding system suffers from the problem identified in the 1960 study; that is, most items are coded vital. For example, about 95 percent of items for the F/A-18 aircraft are coded vital--the items are of major importance to the subsystem. The same situation also applies to ships. According to another study, about 95 percent of items on the allowance lists are coded vital.

An essentiality coding system where a vast majority of the items are coded essential is, in effect, no system at all. This is best illustrated by the way the Navy uses essentiality to set supply availability goals and to identify war reserve candidates.

Setting supply availability goals

Each inventory management activity strives to achieve DOD's supply availability goal 1/ of 85 percent. However, because funds are not sufficient to meet this goal, management must decide which items have a high criticality. ASO and SPCC take a different approach in making this decision. ASO determines which weapons systems are more important from a funding standpoint and sets the supply availability goals accordingly. By doing so, ASO implicitly determines that all parts related to a particular system are equally essential. SPCC, on the other hand, equates the essentiality to an item's demand frequency and sets supply availability goals accordingly. Thus, ASO's and SPCC's stockage level decisions do not consider individual item or mission essentiality in the DOD context.

Identifying war reserve candidates

ASO and SPCC use the same system to identify war reserve candidates. The Chief of Naval Operations specifies which projects require war reserve material, and ASO and SPCC, in turn, identify the items required for the projects. All items coded vital during the provisioning process are considered as war reserve candidates. However, the final decision as to which items have a war reserve requirement depends on such factors as funds available for war reserves and peacetime usage, rather than the essentiality of the items for wartime mission accomplishment.

1/A percentage of total requisitions satisfied from onhand stocks.

Ongoing efforts to better relate essentiality to need

The Navy, in an effort to increase fleet readiness by reducing repair and overhaul turnaround time, developed a shipboard stocking concept. This concept relates the need for stocking an item to its essentiality for mission accomplishment. It will be implemented for the third group of FFG-7 class ships which are to enter the fleet in 1983.

On the basis of this concept and a logistics support analysis, contractors developed the Maintenance Criticality Oriented-Coordinated Shipboard Allowance List (MCO-COSAL). MCO-COSAL included an analysis which shows how the failure of an item will affect a ship's mission capability. The Navy determined that MCO-COSAL would enhance mission capability for the same amount of money required using the current COSAL stockage criteria.

The basic difference between the two stockage determination methods is that under MCO-COSAL, the range and depth of stocked items for the more essential items are increased. The following table shows, by ascending order of essentiality, the number and dollar amount of items that would be stocked under the two methods for the FFG-7 class ships.

Essentiality code	No. of candidates	MCO-COSAL method		COSAL method	
		Items stocked	Cost	Items stocked	Cost
1	8,656	2,380	$140,248	1,850	$869,001
2	3,556	1,789	151,038	1,232	243,685
3	6,225	2,992	417,776	1,482	418,774
4	2,048	1,700	754,618	905	192,315
5	1,220	1,220	597,564	1,220	483,494
Total	21,705	10,081	$2,061,244	6,689	$2,207,269

Using the above information, the Navy simulated its ability to meet needs from the onboard stocks under the two COSAL methods. In its simulation, the Navy assumed that the 21,705 COSAL candidates would fail over a 4-year period and that resupply would be every 90 days. As shown on the following page, use of the MCO-COSAL would result in a significant decrease in the number of unmet needs for the more essential items.

Code	Units short MCO-COSAL	Units short COSAL	Units demanded
1	1,962	2,477	31,660
2	489	1,521	36,460
3	431	2,279	23,565
4	36	1,182	20,273
5	6	582	26,177
Total	2,924	8,041	138,135

Because the MCO-COSAL concept was developed for a new class of ships for which a logistics support analysis had been done, it could not be applied to all existing classes of ships. Thus, the Navy was faced with the problem of how to enhance the shipboard stockage of items essential to mission accomplishment for other ships.

In 1979 the Center for Naval Analyses determined what changes should be made in the shipboard stockage policy to increase readiness. The Center found that, because of extreme variations in equipment failure times, many parts not carried on allowance lists failed, whereas many parts that were carried did not fail. The Center concluded that the current stockage policies were deficient primarily for those parts with a demand every 4 to 10 years and for those parts with two to four demands a year. Furthermore, the Center concluded that the present stockage policy did not consider the relative importance of the systems supported by the parts.

The Center recommended that shipboard stockage be (1) based on two levels of essentiality--one for secondary and one for primary items--and (2) increased from zero to one for those primary mission parts with a demand every 4 to 10 years and from one to two for those items demanded two to four times a year. The Center projected that these changes would reduce the amount of time a ship is not ready by 50 percent and that the life-cycle cost of repair parts would only increase 5 to 10 percent.

As a result of the Center's recommendations, the Navy has developed the modified Fleet Logistics Support Improvement Program-COSAL (FLSIP-COSAL). Depending upon approved funding, the program will be implemented in fiscal year 1983. Under this program, the mission essentiality of the parts will be developed, using historical failure data from casualty reports. As a first step, the Navy's Fleet Material Support Office is developing the essentiality codes and is preparing programs to load the data into the weapons system file. The modified FLSIP-COSAL concept is expected to achieve a higher degree of materiel readiness by

increasing the range or depth of primary essentiality items (codes 3 and 4), while retaining the current stockage levels for secondary essential items (codes 1 and 2).

We did not validate the results of the Navy's analyses for the MCO-COSAL or the modified FLSIP-COSAL concepts. However, if its analyses are correct, implementation of the concepts could significantly increase ship availability time. In the case of MCO-COSAL, the increased ship availability would be achieved at no additional inventory investment because funds for MCO-COSAL were constrained to the level of the regular COSAL method. In the case of the modified FLSIP-COSAL, an additional inventory investment initially would be required because the range or depth of the high-essential items would be increased, while the current inventory level for the less essential items would be retained.

According to Navy officials, no similar analyses have been performed on Navy aircraft. However, the Center for Naval Analyses has initiated a study to identify ways to improve aircraft materiel readiness, and the study will parallel the ones performed on shipboard stockage allowance. In addition, the Fleet Materiel Support Office has been tasked with developing a way to relate supply performance to readiness. The project, called Aviation Readiness Requirements Oriented to Weapons Replaceable Assemblies, will address the subject of mission essentiality of individual items. It will also discuss how stockage of items affects readiness.

CONCLUSIONS

The services recognize the importance of making logistics decisions based on item essentiality to ensure that essential items receive a greater proportion of management attention and resources than non-essential items. Nevertheless, the services have moved slowly toward developing and implementing a system to achieve these objectives, and based on the progress to date, it may be several years before the full potential of an essentiality coding system is realized.

The Air Force has taken the lead in developing an essentiality coding system, and DOD has generally adopted the Air Force's approach as a suggested model for the other services to follow. While we support the Air Force's concept, there are several problems with it which must be resolved if it is to achieve its objective. These problems are addressed in chapter 3.

Although DOD is one of the prime movers behind the services developing an essentiality-based logistics system, it has allowed the services to proceed at their own pace and to implement their own approach for developing a system. As a result, the Army has done little to develop an essentiality-based logistics system, and the Navy has approached the system from the user level, with no plan for extending it to the wholesale requirements level.

In our opinion, a fragmented approach such as this is not likely to result in an uniform item essentiality system that will play a meaningful role in the requirements determination process at the wholesale inventory level.

RECOMMENDATIONS

We recommend that the Secretary of Defense orchestrate the efforts of the services in developing and implementing an essentiality-based logistics system.

We also recommend that the Secretary of Defense establish milestones for accomplishment of each of the tasks identified in the concept paper and monitor the services' progress for achieving these milestones. This would provide increased emphasis for developing an essentiality-based logistics system and would encourage the services to approach the system design and implementation in a more uniform manner.

AGENCY COMMENTS

DOD agreed that it should orchestrate the services' efforts in developing and implementing an essentiality-based logistics system. DOD stated that the services' implementation of the DOD essentiality concept paper is subject to continuing review by the Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics) staff. For example, the staff approved the Navy's scheme in October 1981. Furthermore, the Air Force is refining its coding assignments, and the Army plans to use essentiality coding as part of the retail stockage criteria in implementing DOD's retail inventory management and stockage policy program. According to DOD, the Army Inventory Research Office has begun to examine the use of essentiality coding in the requirements determination process, and DOD will continue to monitor the services' progress in implementing the essentiality concept.

DOD also agreed that milestones for accomplishing the essentiality concept tasks should be established and that DOD should monitor the services' progress for achieving these milestones. DOD pointed out that the milestones for each service would have to be different because of the significant differences in the approach for implementing and developing the essentiality concept, computer technology, organizational structure, and requirements methodology. Accordingly, DOD plans to review the services' established milestones and to approve or modify the milestones based on the aforementioned factors.

CHAPTER 3

CHANGES NEEDED TO IMPROVE THE USEFULNESS OF THE AIR FORCE'S ESSENTIALITY CODING SYSTEM

The Air Force is in the forefront in developing an essentiality-based logistics system. From a conceptual standpoint, the system is sound; however, as highlighted in the previous chapter, the Air Force faces some serious problems in applying the system in a real world environment. The major problems concern the fact that:

--The majority of the items are coded mission essential.

--Certain nonessential items have a higher essentiality ranking than essential items.

--The system essentiality code (the first digit of the coding system) has limited use in the logistics decisionmaking process.

Primarily, as a result of these problems, the potential benefits of an essentiality-based logistics system have not been fully realized. The problems are not unsolvable, but their resolution will require changes in management philosophy and increased command emphasis and attention.

THE MAJORITY OF AIR FORCE REPARABLE ITEMS ARE CODED MISSION ESSENTIAL

The objective of the Air Force's essentiality coding system is to accurately determine the relative essentiality of items. However, it has been rendered ineffective by the fact that about 87 percent of Air Force reparable items are coded essential to the accomplishment of the Air Force's wartime mission.

AFLC analyzed the approximately 124,000 reparable items managed by its five air logistics centers. The table below gives the results of the analysis.

Code	Effect of item failure	No. of items	Cumulative percent
Mission critical:			
AE	Weapons system cannot perform any of its wartime/peacetime missions.	60,562	49.0
BE	Weapons system cannot perform any of its wartime missions.	8,867	56.2

Code	Effect of item failure	No. of items	Cumulative percent
Mission essential:			
CE	Weapons system can only perform some of its wartime missions.	8,424	63.0
AF	Weapons system cannot fully perform any of its wartime/ peacetime missions.	15,767	75.7
BF	Weapons system cannot fully perform any of its wartime missions.	8,783	82.8
CF	Weapons system can only partially perform some or one of its wartime missions.	5,053	86.9
No effect on wartime mission:			
DE	Weapons system cannot perform any of its peacetime training missions.	2,293	88.8
DF	Weapons system cannot fully perform any of its peacetime training missions.	10,549	97.3
No effect on weapons system performance:			
AG, BG CG, DG	No effect on weapons system performance.	3,396	100.0
Total		123,694	100.0

Since six possible system essentiality codes (the first digit) could be applied in each situation, the six mission critical and mission essential codes shown above account for 36 of the 72 ranking priorities in the Air Force's total coding scheme. On the basis of priorities, AFLC stratified the fiscal year 1981 aircraft replenishment requirement for reparable parts by essentiality code and determined that 98 percent of the total dollar requirements were for the 36 mission critical and mission essential codes.

Priorities	Value of requirements	Percentage of total dollar requirements
	(000 omitted)	
1-36	$1,931,216	98.0
37-72	7,894	0.4
73 (foreign military sales)	32,152	1.6
Total	$1,971,262	100.0

The problem of a vast majority of the items being classified as mission essential is the same problem we identified in our 1978 report, "Essentiality of Air Force War Reserve Items." At that time, 81 percent of Air Force-managed items were coded mission essential, and our 1978 review showed that 61 of the 199 sample items were coded incorrectly as mission essential. In this review, we found that 18 of the same items were still coded as mission essential.

DOD and Air Force officials said that it is expected that a high percentage of Air Force items would be considered essential for the wartime mission. Additionally, they stated that the 36 priority rankings, comprising 87 percent of reparable items, provide the needed flexibility to distinguish between levels of essentiality and to set varying levels of funding based on mission essentiality.

In our opinion, when the majority of items are coded essential, the usefulness of a coding system as a management tool for making logistics decisions is limited. Furthermore, the Air Force has not used the coding system to set varying funding levels.

SOME NON-ESSENTIAL ITEMS HAVE A HIGHER PRIORITY THAN ESSENTIAL ITEMS

The Air Force assigns a higher essentiality priority to certain items having no effect on mission capability than it does to certain items having an effect on mission capability. The reason for this situation is that the priority ranking system emphasizes the essentiality of the subsystem, rather than the essentiality of individual items. To illustrate, in the case of two items, one with a mission essentiality code of 1CG (item not critical to subsystem operation) and the other with a code of 1DE (item critical to subsystem operation), the item coded 1CG has a higher priority ranking than the item coded 1DE.

In another example, we compared an item coded 6AG with an item coded 1DE. The item coded 1DE is critical for operation of a subsystem, and the subsystem is essential to the operation of the weapon system. The item coded 6AG is not critical for the operation of a subsystem (code G), but the subsystem is essential

to the operation of a low-priority weapons system (code A). In this case, also, the item that is critical for operation of a priority 1 weapons system (1DE) is given a lower priority ranking than the item that is not critical for operation of a lower priority weapons system (6AG).

Our analysis showed that the situation described above occurred for 18 of the 72 priority rankings and that the items in the 18 rankings accounted for about 3,000 of the total Air Force-managed reparable items, as shown below.

Priority ranking	Essentiality code	No. of items
37-42	1AG - 6AG	2,597
43-48	1BG - 6BG	64
49-54	1CG - 6CG	320
Total		2,981

While the number of items involved is relatively small, the important aspect is that these non-essential items have a higher priority than 12,800 other items--in priority rankings 55 to 66--that are considered more essential.

AFLC officials were unable to explain the reasons for the inconsistent rankings, except to say that apparently the subsystem is the driving factor behind the overall priority rankings.

DOD and Air Force officials stated that, in establishing the priority ranking system, a decision had to be made to support either

--wartime mission items that are not critical ahead of strictly peacetime mission items that are essential or

--peacetime mission items that are essential ahead of wartime mission items that are not essential.

Since the Air Force's system concentrates on support of the wartime mission, the first option was adopted.

We agree that the emphasis of any logistics support system should be directed at the wartime mission. However, that is not the point being made in this report. Our point is that it is questionable why an item which has no adverse effect on the operation of the subsystem or mission capability of the weapons system--regardless of the system's mission--should have a higher priority ranking than items which prevent or impair the mission performance of the system, even if it is only a peacetime mission.

ESSENTIALITY HAS LIMITED CURRENT OR PLANNED USAGE

The problems discussed in the previous sections have severely limited the use of essentiality as a major consideration in allocating resources, determining war reserve candidates, or scheduling parts for repair.

Even though the Air Force is a proponent of essentiality, it has done little to solve the problems and to make essentiality a viable management tool. The service has opted for other alternatives, such as using contractor-developed modeling techniques for allocating resources and determining war reserve needs. With regard to scheduling items for repair, the deciding factors are the availability of repair facilities, the onhand stock position of the reparable item, and the need to keep specialized repair lines operating--not the mission essentiality of a particular item.

Air Force officials stated that, although the service is not progressing as fast as desired, they are moving as quickly as resources will allow. They attribute the lack of progress to unreliable data processing equipment which requires that computer programs be converted to other data systems. When the conversions are completed, they plan to determine how essentiality can be used to establish reparable item safety levels.

Allocating resources

The Air Force allocated its fiscal year 1981 repair and spare parts funds on the basis of a model developed by the Logistics Management Institute. The model, which uses data in the Air Force reparable requirements system, computes the funding level required for repair and spare parts for each system to achieve a range of aircraft availability rates. This procedure allows the Air Force to pick and choose among the various availability rates based on the funding level received.

Logistics Management Institute officials said that the availability model is being modified to consider item or subsystem essentiality. According to the officials, the effect of the modification will be that the same availability rates can be obtained with less repair and procurement funds, because only the essential items will be considered in determining required funding levels.

In our opinion, unless more definitive criteria are developed which solve the problem of most items being coded essential, the modification will not have any significant effect on the funding levels required to obtain desired aircraft availability rates.

System essentiality is not the driving factor for determining war reserve candidates. Air Force headquarters selects the weapons system for which war reserve requirements will be computed.

AFLC then identifies the mission essential items (using the last two digits of the coding system) associated with the particular weapons system and computes the war reserve requirements for those items. However, the actual requirements computation does not differentiate varying degrees of essentiality.

In March 1981, the Air Force entered into a letter contract with the International Computing Company. One aspect of the contract provides that the contractor will develop a model to compute and allocate, based on the relationship established by the last two digits of the essentiality code, war reserve material for specifically identified aircraft. Development of the model is expected to require 30 months after contract definitization, which was planned for September 1981.

While this approach is a step in the right direction, the fact that the model will use the subsystem and item essentiality codes in the requirements determination still does not solve the problem that most items are coded mission essential. Thus, most items on a particular weapons system will be considered war reserve candidates, and a war reserve requirement will be computed for items that may not, in fact, be mission essential.

Scheduling items for repair

The current essentiality coding system is of little benefit to Air Force managers in scheduling items for repair because of a lack of trust in the code's validity and because other factors are considered to be more important.

Repair workloads for each air logistics center are determined on a quarterly and biweekly basis. Part of this determination process involves scheduling the workload requirements in mission essentiality and demand frequency sequence. However, officials at the San Antonio Air Logistics Center told us that little, if any, attention is paid to the schedules because of the subjectivity used in assigning the codes. Other factors include:

--An item causing an aircraft to be grounded has the highest repair priority regardless of essentiality.

--The current stock level of a reparable item is more important than the item's essentiality ranking.

--The repair sections are specialized operations which repair certain type weapons systems, subassemblies, or components. Most have essentiality priorities. Thus, it would be difficult to use essentiality rankings in an aircraft engine overhaul shop, for example, because every part, component, and subassembly is considered to be equally important to the operation of that engine.

--Reparable carcasses may not be available as planned due to changes in failure rates, planned flying hours, and other factors.

--The equipment specialist may request that a lower priority item in a backorder position be repaired before a higher priority item for which there is onhand stock.

DOD officials believe that all of the above-listed factors, including essentiality, must be considered when making repair scheduling decisions.

We agree that the above factors should be considered when determining what items should be repaired and that items in long supply should not be repaired just because of their essentiality ranking. However, deviations from the planned repair schedule should be the exception rather than the rule and, all other matters being equal, mission essentiality should be the driving factor for determining repair priorities.

CONCLUSIONS

The Air Force's essentiality concept is valid because it offers vast potential for making informed logistics decisions for allocating resources, identifying war reserve needs, and determining repair priorities. Unfortunately, the Air Force's implementation of the essentiality concept has been plagued with problems, such as most items are subjectively coded mission essential and certain non-essential items have a higher essentiality ranking than other more essential items. Consequently, the concept's usefulness as a decisionmaking management tool has been degraded.

We believe that if the Air Force's current coding system is ever to achieve its full potential, these problems will have to first be resolved. Otherwise, the essentiality coding system will continue to exist in name only.

RECOMMENDATIONS

We recommend that the Secretary of Defense direct the Secretary of the Air Force to:

--Develop essentiality coding criteria which make the coding system more responsive and permit the logistics system to better meet user needs. Also, review the current situation where the vast majority of items are coded mission essential.

--Regularly review the relationship between item essentiality and system essentiality to identify and reconcile inconsistencies in these relationships.

AGENCY COMMENTS AND OUR EVALUATION

DOD agreed that the essentiality coding criteria should be more responsive in order for the logistics system to meet user needs. DOD said that the problem areas cited in the report regarding the need to expand the use of essentiality coding are a reflection of two fundamental problems facing the Air Force. First is the outdated logistics automated data processing equipment in use at the air logistics centers. The changes required to expand the use of essentiality coding are time-consuming and can only be accomplished consistent with available resources and established data processing system change schedules. Second, the application of essentiality codes must be recognized, used, and supported by operational and support factions outside the material requirements determination environment. According to DOD, the Air Force has long recognized this situation, which is also affecting Army and Navy planners, and is proceeding prudently in the application of essentiality criteria in such areas as repair scheduling, resource allocation, and war reserve material stockage.

DOD did not agree with our draft recommendation to determine why subsystem essentiality, as opposed to item essentiality, is the driving factor for assigning priority rankings to some mission essential items. According to DOD, no one position of the multidigit coding system has priority over another code position. DOD said that the coding system permits an essential part on a less essential weapon to have an equivalent rating to a somewhat less essential part on a more essential weapon. And conversely, a non-essential part on an essential weapon normally would be accorded a lesser overall essentiality value. DOD further stated that the Air Force recognizes that some inconsistencies in item coding may occur and the Air Force will continue to review and refine the coding as necessary.

Our draft recommendation was directed at what appeared to be the reason for the inconsistencies identified during our review. As mentioned previously, about 3,000 non-essential items--for essential as well as less essential weapons--have a higher priority ranking than some 13,000 more essential items. Lack of the latter items can prevent or degrade the weapons from performing their designated mission or function. Our position was that these inconsistencies need to be reviewed and resolved. To eliminate the confusion perceived by the Air Force and DOD, we clarified the recommendation as shown above.

DOD'S CONCEPT PAPER ON

ESSENTIALITY FOR SECONDARY ITEMS

The purpose of this paper is to provide a conceptual basis for the development and implementation of an item essentiality coding procedure for the wholesale requirements determination process for secondary items centrally managed by DOD Components.

Essential - "A fundamental, necessary or indispensible part, item, or principle." - American Heritage Dictionary.

For many years the DoD Logistics community has recognized a need to identify and measure the relative merit or priority of maintaining stocks of a given item of supply over stocking some different item. Ordinarily, this identification of "essentiality" is based on some pre-established criteria which relates the importance of an item to the more complex assembly of which it is a part or if the item is an end item in itself, essentiality may be expressed in terms of the item's value in accomplishing its designated military mission. Measures of essentiality are often expressed in terms of a penalty to be paid if stocks of an item are not available when needed. For example: lack of a part may result in a non-mission capable condition; for end items, essentiality measures seek to quantify the destruction of the enemy, personnel protection, communications, surveillance, training or, in peacetime, maintaining some measurable degree of military capability - vaguely categorized as "readiness."

There is currently a widespread perception among logistics managers that the development of essentiality coding for secondary items is an area in which many efforts have been initiated in the past with few positive results. In fact, all DoD Components have developed some variation or approach to essentiality coding and in some cases are using this coding in the requirements development process. The current status of the use of essentiality coding is documented in detail in the Weapon Systems Relationship portion of this Report. 1/

Currently the Components in varying degrees use actual or implied essentiality coding for the following purposes:

1. Selection of War Reserve Items.

2. Use of an essentiality factor in Variable Safety Level computations.

1/The report referred to is "DoD's Stockage Policy Analysis" dated August 31, 1980. The weapons systems relationship portion of that report is not included in our report.

3. Prioritizing repair schedules for reparable items.

4. Applying more intensive management to selected items.

5. Selection of some items for stockage when the items do not qualify for demand based stockage.

The next logical phase of the use of essentiality would appear to be the development of uniform essentiality coding procedures. For secondary items--reparable components, minor end items, and repair parts--essentiality identification and measurement is required to permit a more logical allocation of available inventory management and funding resources. The fundamental premise is that more essential items should receive a greater share of management attention and funding than less essential items. It follows that the more essential items should also have higher supply support performance objectives. An important prerequisite to the use of essentiality coding as an element of the requirements determination process is the development of the capability to obtain and use application data to establish the indentured relationship from item to assembly to end item. For the range of secondary items encompassed by the requirements determination process, the relative essentiality of each item to its next higher assembly and that assembly to an end item must be established.

To develop an essentiality coding technique for use in the computation of requirements for secondary items, it is necessary to consider three elements:

1. There must be a technique to identify and measure item essentiality. Item essentiality describes the need for an item relative to its next higher assembly. Generally, this determination requires a technical judgment by an equipment specialist capable of deciding the degree to which an item is required for operations of the assembly or end item.

2. Intermediate assemblies must be related to an end item with a military application such as a weapon system. Ordinarily, the assembly/end item relationship can be determined by establishing the relative essentiality of the several assemblies which make up an end item. This determination requires both a technical judgement regarding the degree of criticality of an assembly to the operation of an end item, and an operational judgement regarding the relative importance of an assembly to the performance of the end item's mission(s). Two problems become apparent at this point. First, how should items common to more than one application be coded as to essentiality and second, how should items with no readily determinable assembly/end item relationship (e.g., Army helmets) be handled. These problems are addressed later in this paper.

3. Essentiality coding must consider mission essentiality. For purposes of secondary item requirements determination, this element should probably be defined in such terms as strategic mission, tactical mission, training, or other broad mission category rather than to attempt to capture the day-to-day variations of mission activity. The mission essentiality element should be used to establish the relative priority of one end item to another, recognizing that many end items may have the same level of priority. That is, it is unncessary to separately rank each end item but rather a small number of priority groupings (5-10) may be sufficient for requirements determination purposes. Mission coding may also relate to the use of the item itself, e.g., a safety of flight item may require a high essentiality rating by virtue of its use.

To achieve a higher level of supply performance (i.e., supply availability, response time) for more essential items than for less essential items, a technique should be used in the requirements development process which allocates a higher level of resources to more essential items and measures the performance of these items based on established support objectives. In current systems this means either giving higher safety levels to more essential items or insuring some stockage levels are developed for essential items which ordinarily would not qualify for stockage on a demand basis. Current concepts usually segregate demand based items from non-demand based items. Demand based items are generally selected for stockage (range and depth) based on demand projections and/or economic trade-offs regardless of essentiality considerations. To the extent it is applied, essentiality for demand based items becomes an additional factor used to provide an incremental increase to safety levels usually on a selective basis.

For non-demand based items, current policy provides that essentiality is the primary selection criteria for determining the range of items to be stocked. Currently used depth of stockage criteria for these items, however, generally ignores essentiality considerations. This report supports the concept that supply performance should be measured in terms of response time. This is discussed in considerable detail in other parts of the Report. If we can conclude that both essentiality and response time are primary elements of the requirements determination process for both demand and non-demand based items, then an axiom can be proposed that states:

<u>Response time performance should be improved as essentiality increases</u>.

The practical application of this rule would be to compute relatively higher stockage levels for more essential items. A corollary to this proposal would be that stockage level development would recognize the need to minimize response times for

essential items (both demand and non-demand) and to apply constraints such as funding limits, demand deviation limits, maximum order quantities, probability of demand factors or policy guidelines to less essential items first. Response time related range/depth models should incorporate the above essentiality concepts. The result would be that both demand and non-demand based items would be assigned response time goals based on essentiality coding and thus would compete for resources even though their stockage models might differ.

The use of variable response time objectives, based on degrees of essentiality, requires that secondary item funding resources be allocated based on minimizing response times in sequence from more essential to less essential items. DoD Components have already initiated this approach to a limited degree by segmenting certain items perceived to be more essential (i.e., a higher priority weapon system or some other more essential grouping).

Resolution of the essentiality problem can be accomplished in three phases:

1. Development of an acceptable essentiality coding technique including application relationships.

2. Integration of the essentiality coding technique into performance measurement and range/depth models.

3. Implementation of the essentiality coding technique including coding of items, establishment of essentiality related performance objectives, and effecting needed changes to impacted requirements determination systems.

The first phase of resolving the essentiality problem should focus on the development of the uniform essentiality code. One approach is to accept that the code to be assigned to each secondary item must comprehend the three elements discussed previously:

1. Item Essentiality

2. Intermediate Assembly Essentiality

3. Mission Essentiality

Using a three digit code permits identification of all three factors. See enclosure (1). 1/ In each case the code value(s) should reflect a range from least essential to most essential. For example, an item essentiality value of "A" might represent a most essential part without which the next higher assembly could not operate; a value of "C" might indicate a decorative or

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1/The enclosures referred to in this concept paper are not included in our report.

nonfunctional component. Items with no readily identifiable next higher assembly or end item relationship - primarily personnel support items - should be coded based on their essentiality relationship to the accomplishment of a particular mission or function. Enclosure (2) describes a "strawman" item essentiality coding technique.

The intermediate assembly essentiality value would show the impact of an assembly on the performance of the applicable end item. For example, the highest intermediate assembly essentiality value might indicate that lack/failure of the assembly would completely prevent operation of all functions of the applicable end item. The lowest intermediate assembly essentiality value might indicate that lack/failure of the assembly would not impact the operation of the end item. Interim values would indicate varying degrees of impact on end item operation. Enclosure (3) describes a "strawman" intermediate assembly essentiality coding technique.

The mission essentiality code would recognize essentiality on the basis of military mission--i.e., strategic system, safety/personnel protection, etc., and the relative priority of end items within these groupings. Enclosure (4) describes a "strawman" mission essentiality coding technique. In ranking items under this coding structure, the mission code would be considered first, followed by the intermediate assembly code and finally the item code.

In determining essentiality, application files must be developed which, at a minimum, show the relationship of an item to its next higher assembly and the assembly to an end item application. More sophisticated application files would show the indentured relationship of an item to intermediate assemblies and ultimately to an end item, and show quantities per application. If the data system is sufficiently sophisticated to show demand/usage or item population by end item, essentiality coding for the item could be segmented by these factors and multiple performance objectives established to help insure the appropriate level of support for each essentiality segment. If this segmentation is not feasible, assignment of the highest applicable priority code for item, intermediate assembly, and mission elements is a practical alternative.

The second phase of the essentiality effort must be integrated with the range/depth models for demand and non-demand based items. Specifically, the capability should be developed to select a range of response time objectives based on varying degrees of essentiality for a logical grouping of items. Examples of logical groupings would be: items used on a specified weapon, items in a given Federal Supply Class, items in a specific budget program, or items managed by a specific Inventory Control Point. These are the same basic breakouts currently used in the variable safety level computations.

Use of essentiality in the response time models applicable to both demand and non-demand based items would have two aspects. First, in the requirements development phase, a response time objective would be established for a range of essentiality values. For example, the highest level of essentiality might require a 15-day response time objective, whereas a lesser level of essentiality might require a 25-day response time objective. Using these objectives, the range/depth requirements computations would be processed and used as the basis for budget projections. In the execution phase, available funding would be allocated to each essentiality grouping in sequence from highest to lowest level of essentiality. A simulation capability would be developed to price out proposed changes in the response time objective or to project the extent to which response times could be met based on a given funding level.

The third phase of the essentiality effort would be the implementation of secondary item requirements determination on an essentiality basis, that is, the implementation of the capabilities developed in phases 1 and 2. The coding of items for essentiality actually should begin concurrent with the computational models. Additionally, development of the needed application files should begin as soon as possible after the codes are developed. The implementation phase can be accomplished on an incremental basis consistent with the building of application data, the coding of items, the implementation of response time and stockage models, and the development of response time objectives.

In the short term, it is envisioned that the several Components may have a varying degree of sophistication in the development and content of the specific essentiality codes. This fact should not be considered prejudicial to the coding effort as the purpose of establishing the essentiality codes is not to be able to make inter-Component comparisons of essentiality, but rather to measure relative essentiality within rather limited item groupings.

The implementation of the essentiality approach described in this paper appears to represent an achievable, practical, and affordable effort and should satisfy the need for essentiality considerations within the secondary item requirements determination process for the foreseeable future.

ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301

SR
MANPOWER,
RESERVE AFFAIRS
AND LOGISTICS

3 DEC 1981

Mr. Donald J. Horan
Director, Procurement, Logistics
and Readiness Division
General Accounting Office
Washington, D.C. 20548

Dear Mr. Horan:

This is in response to your letter of October 22, 1981 which transmitted your Draft Report SMD-81-41/Code 947445 titled, "Mission Item Essentiality has Vast Potential as a Management Tool for Making More Informed Logistics Decisions" (OSD Case #5812).

Comments received from the Military Services have been considered in preparation of the enclosed response which addresses each of the recommendations contained in the Draft Report. In addition, comments are provided with respect to the specific content of the Report.

We appreciate the opportunity to comment on this report in draft form.

Sincerely,

James N. Juliana

James N. Juliana
Principal Deputy Assistant Secretary of Defense
(Manpower, Reserve Affairs & Logistics)

Enclosure
As stated

GAO note: Page numbers in this appendix refer to page numbers in the draft report.

APPENDIX II

DEPARTMENT OF DEFENSE
RESPONSE TO GAO DRAFT REPORT
"Mission Item Essentiality has Vast Potential
as a Management Tool
for Making More Informed Logistics Decisions"
(SMD-81-41/947445) (OSD Case #5812)

Recommendation: That the Secretary of Defense assume responsibility for orchestrating the efforts of the Services in developing and implementing an essentiality-based logistics system. The essentiality concept paper proposed in DoD's "Stockage Policy Analysis" report sets forth the necessary approach for developing an effective essentiality system; however, its use should be a requirement rather than just a guide for the Services to follow.

Response: Concur. The Secretary of Defense has assumed responsibility for orchestrating the efforts of the Services in developing and implementing an essentiality-based logistics system. The OASD(Manpower, Reserve Affairs and Logistics) published the essentiality concept paper as part of the 1980 DoD Stockage Policy Analysis. The Services' implementation of the essentiality concept as a part of their materiel requirements methodology is subject to a continuing review by the OASD(MRA&L) staff. In October 1981, the Navy's approach to essentiality coding was approved for implementation. The Air Force had previously implemented the essentiality concept and is in the process of refining their coding assignments. As an initial step, the Army intends to use essentiality coding as a part of the retail stockage criteria in implementing DoD's Retail Inventory Management and Stockage Policy (RIMSTOP) program. Further, the Army has initiated a study by the Inventory Research Office to examine the use of essentiality coding in their requirements determination process.

As each Service has already begun development and implementation of essentiality coding, the recommendation by GAO to formalize the use of the DoD concept paper is unnecessary. OASD(MRA&L) will, however, continue to monitor Service progress toward implementation of the essentiality concepts.

Recommendation: That the Secretary of Defense establish milestones for accomplishment of each of the tasks identified in the concept paper and monitor the Services' progress for achieving these milestones. This would provide increased emphasis for developing an essentiality system and encourage the Services to approach the system design and implementation in a more uniform manner.

Response: Concur in principle. DoD agrees that milestones for accomplishing the implementation of the essentiality concept should be established and that OASD(MRA&L) should monitor Service progress for achieving these milestones. However, because of significant differences in

the current status of essentiality concepts, computer technology, organizational structures, requirements methodologies and other factors, the milestones for implementation of the essentiality concept must be tailored to each individual Service. The approach currently being used by OASD (MRA&L) is to review Service established milestones and approve or modify the Service plans in consideration of the aforementioned factors. This approach should permit the most timely and effective implementation of the essentiality concept.

Recommendation: That the Secretary of Defense direct the Secretary of the Air Force to develop essentiality coding criteria which makes the coding system more responsive for determining logistics needs, and reduces the current situation whereby the vast majority of items are coded mission essential.

Response: Concur in principle. DoD agrees that essentiality coding criteria should make the coding system more responsive and permit the logistics system to meet user needs. The areas cited by GAO in the Draft Report with respect to expanding the Air Force's use of essentiality coding reflect two fundamental problems facing the Air Force. First is the outdated logistics Automatic Data Processing (ADP) equipment in use at Air Force Air Logistics Centers. The system changes required to expand the use of essentiality coding are extremely time consuming and can only be accomplished consistent with available resources and established data processing system change schedules. Second, the application of essentiality codes, to be effective, must be recognized, used and supported by operational elements and other support factions outside the materiel requirements determination environment. The Air Force has long recognized this situation, which is also impacting Army and Navy logistics planners, and is proceeding prudently in the application of essentiality criteria in such areas as repair scheduling, allocation of resources, and war reserve materiel stockage. The GAO Draft Report characterizes the Air Force essentiality scheme as coding the vast majority of reparable items as mission essential. This finding is misleading, however, as it fails to recognize that reparable items by their nature are most often essential to some aspect of an aircraft peacetime or wartime mission. Further, the GAO recommendation fails to acknowledge (although it is clearly evident in the text of the report) that the Air Force coding scheme provides for significant determination of degrees of essentiality within the grouping of items designated as "mission essential."

Recommendation: That the Secretary of Defense direct the Secretary of the Air Force to determine why subsystem essentiality is the driving factor for assigning priority rankings to some mission essential items.

Response: This GAO recommendation fails to recognize the basic intent of the use of a multi-digit coding scheme for essentiality. There is, in fact, no priority of one position of the code over another since each position measures different factors, each of which contributes to overall

essentiality. The Air Force system, which is endorsed by the DoD Essentiality Concept paper, provides a technique whereby each element of essentiality (expressed by a position within the code) is measured separately based on the priority of the weapon (position 1), the importance of the subsystem to the weapon's mission (position 2), or the importance of the part to the subsystem operation (position 3). This approach permits an essential part on a less essential weapon to be given a rating equivalent to a somewhat less essential part on a more essential weapon. Conversely, a non-essential part on an essential weapon normally would be accorded a lesser overall essentiality value. This approach permits a more effective balancing of spare parts essentiality across the total range of weapon systems and precludes the allocation of all high essentiality considerations (and accompanying resources) to the high priority weapons group, e.g., strategic systems. Air Force recognizes that some inconsistencies in specific item coding may occur and will continue to review and refine coding as necessary.

Additional Comments:

1. Page iii, second paragraph, (also pages 11 and 23): "...the essentiality system is not currently being used as a management tool for making those key logistics decisions concerning requirements determination, resources allocation and repair priority."

   Comment: The Air Force uses essentiality coding in the computation of war materiel requirements and in the ranking of items for repair.

2. Page iii, third paragraph, (also pages 11, 23, and 24): "...the vast majority (about 87 percent) of the Air Force managed reparable items are coded mission essential, which, in effect, limits management's flexibility for using item essentiality as a management tool."

   Comment: It is expected that a high percentage of Air Force reparable items would be considered essential for the wartime mission. The 36 individual codes comprising the 87% figure contained in the Report provide the needed flexibility for the Air Force to distinguish between the different levels of essentiality and thus provide varying levels of funding based on mission essentiality.

3. Pages iii and iv, last paragraph, (also pages 11 and 23): "...the coding system assigns a higher essentiality priority to certain items that have no effect on mission capability and a lower priority to certain items that prevent or impair mission accomplishment."

   Comment: The essentiality system consists of a three digit code ranked in 72 increments of priority. In establishing this ranking, a decision had to be made to support:

   (a) wartime mission items that are not critical ahead of strictly peacetime mission items that are essential, or

   (b) peacetime mission items that are essential ahead of wartime mission items that are not essential.

   Since the Air Force system concentrates on support of the wartime mission, option (a) was adopted.

4. Pages v and vi, last two lines: "According to Navy studies, the essentiality configured allowance lists will significantly increase the operational availability of ships without increasing the cost of shipboard allowances."

   Comment: The above statement is correct for only one of these classes of ships (FFG-7 Class), but only because the allowance for MCO-COSAL has been constrained to the cost of current shipboard allowance computations. The MCO-COSAL Model is designed to maximize supply effectiveness within a fixed funding level or, conversely, to determine the

cost to achieve a given level of supply effectiveness. This is achieved by considering not only essentiality, but also unit cost and demand. The TRIDENT allowance model has not been cost constrained.

5. Page vi, second paragraph: "The Navy does not plan to extend the essentiality system to the wholesale level and has only recently initiated efforts to determine item and mission essentiality for its aircraft."

   Comment: On July 28, 1981, Navy submitted a recommended set of rules for Item Essentiality Coding of Secondary Items to the Office of the Secretary of Defense (OSD) for approval. On October 15, OSD approved those Item Essentiality Coding Rules for use by Navy, including their use in the variable cost models for determining stockage levels in the wholesale and retail inventories. The initial use of this essentiality coding will be in the tailoring of all shipboard allowances to provide adequate support for primary mission weapon systems. Navy is pursuing the essentiality coding of aircraft weapon systems and the use of essentiality coding at the other wholesale and retail inventory levels.

6. Page 6, second paragraph: "The Navy considers all stocked items to be equally essential."

   Comment: The Navy Item Essentiality Coding Rules for secondary items will stratify the inventory for shipboard systems among four primary levels of essentiality, with a fifth level for personnel safety-type items.

7. Page 10, last paragraph: "To date, the emphasis has been on coding the reparable items in the Recoverable Consumption Item Requirements Computation System -- the D041 system -- with the coding of consumable items and support equipment still several years away."

   Comment: Consumable items are coded now. Support equipment coding is scheduled for completion in about a year.

8. Page 12, first paragraph: "The Army assigns an essentiality code, ... during the initial provisioning process. However, little use is made of the code. Its only use is as one of several criteria for identifying war reserve candidates."

   Comment: These statements are incorrect. The Army, by implementing the Retail Inventory Management and Stockage Policy (RIMSTOP), will use the essentiality codes to select items for stockage and to establish safety levels at the retail level. In addition, the Inventory Research Office is performing a study that will result in a proposed coding scheme and recommend potential uses of essentiality coding at the wholesale level.

9. Page 18, fourth line: The correct name for the organization is "Center for Naval Analyses."

10. Page 18, second paragraph: "...the Center recommended that shipboard stockage be (1) based on those parts critical to the primary mission of the ship...."

    Comment: The Center for Naval Analyses recommended that shipboard stockage be (1) based on two levels of support - one for secondary missions of the ship and another for primary missions of the ship; (2) continued with present allowance rules for secondary mission parts; and (3) increased for primary mission parts demanded every four to ten years and those demanded two to four times a year.

11. Page 18, next to last line: "Modified FLSIP is to be implemented in fiscal year 1983."

    Comment: Implementation is dependent upon approval of funding.

12. Page 19, first paragraph: "The Modified FLSIP-COSAL concept, like the MCO-COSAL concept, is expected to achieve a higher degree of material readiness by increasing the range and depth of medium to high mission essential items and reducing the stockage of less essential items."

    Comment: The Modified FLSIP-COSAL will not decrease the stockage of any items. Modified FLSIP will continue current allowance rules for secondary mission parts and increase the range or depth for primary mission parts within certain demand parameters.

13. Pages 19-20: The tables on pages 19 and 20 reflect an MCO-type COSAL mix of repair parts and do not reflect the conclusions of the Center for Naval Analyses Study of Shipboard Parts Allowance Policy Report nor analyses of the Modified FLSIP-COSAL conducted by FMSO.

14. Page 20, first paragraph: "However, if their analyses are correct, implementation of the planned concepts would significantly increase ship availability time at no additional cost."

    Comment: The MCO-COSAL model has been constrained to current allowance costs. The Modified FLSIP-COSAL will increase the cost of the COSAL because it enhances the range or depth of primary mission parts within certain demand parameters but does not reduce the current support to secondary mission equipments.

15. Page 23, first paragraph: "..the system essentiality code...is not used in the logistics decision-making process nor does the Air Force have any plans to use it in the future."

Comment: This statement is incorrect. Air Force currently differentiates between weapon systems with a system essentiality code of 1 or 2 (support at a 85% availability rate) and those with codes of 3 through 6 (support at a 67% availability rate).

16. Page 28, first paragraph: "Other Air Force officials were concerned ..."

Comment: The Air Force has been unable to identify the officials quoted in this sentence. Recommend sentence be deleted.

17. Page 28, last paragraph: "Even though the Air Force is a proponent of essentiality and its benefits, there is no concerted effort within the Service to fix the problems and make essentiality a viable management tool."

Comment: The Air Force, though not progressing as fast as desired, is moving as quickly as resources allow. Because of the increasing unreliability of the IBM 7080 computers, the Oklahoma City Air Logistics Center is having to convert many 7080 programs to an Ondahl computer. With completion of this conversion effort in the spring of 1982, Oklahoma City will begin a study to determine how best to use essentiality in the D041 variable safety level computations.

18. Page 28, last paragraph: "With regard to scheduling items for repair, the decision is driven more by the availability of repair facilities. the on-hand stock position of the reparable item, and the need to keep specialized repair lines operating than by the mission essentiality of a particular item."

Comment: It is the DoD position that all the listed factors, including essentiality, must be considered when making repair scheduling decisions. A critical item in long supply should not be repaired simply because it has a high ranking essentiality code.

19. Page 29, next to last paragraph: "In our opinion, unless more definitive criteria is developed which solves the problem of most items being coded essential, the modification to the model will not have any significant effect on the funding levels required to obtain desired aircraft availability rates."

Comment: See comment 2 above.

20. Page 31, first paragraph: "...officials at the San Antonio Air Logistics Center told us..."

Comment: This is not the Air Force position. Recommend this statement be deleted from the Report.

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